

# Acronyms and Glossary

## Symbols and Units of Measure

°C	degree centigrade
°F	degree Fahrenheit
$\sigma$	sigma
aCi	attocurie ( $10^{-18}$ Ci)
$\mu\text{Bq}$	microbecquerel ( $10^{-6}$ Bq)
$\mu\text{g/g}$	microgram per gram ( $10^{-6}$ g/g)
$\mu\text{g/L}$	microgram per liter ( $10^{-6}$ g/L)
$\mu\text{g/m}^3$	microgram per cubic meter ( $10^{-6}$ g/m <sup>3</sup> )
$\mu\text{rem}$	microrem ( $10^{-6}$ rem)
$\mu\text{Sv/y}$	microsievert per year
Bq	becquerel (See <i>also</i> definition in <b>Key Terms</b> section.)
Bq/g	becquerel per gram
Bq/kg	becquerel per kilogram
Bq/L	becquerel per liter
Bq/m <sup>3</sup>	becquerel per cubic meter
Bq/mL	becquerel per milliliter
Ci	curie (See <i>also</i> definition in <b>Key Terms</b> section.)
cm	centimeter
ft	foot
g	gram
gal	gallon
gal/d	gallon per day
gal/min	gallon per minute
GBq	gigabecquerel ( $10^9$ Bq)
in.	inch
keV	kiloelectronvolt ( $10^3$ eV) (See <i>also</i> definition of “electronvolt” in <b>Key Terms</b> section.)
kg	kilogram ( $10^3$ g)
kg/d	kilogram per day ( $10^3$ g/d)
km	kilometer ( $10^3$ m)
L	liter
L/d	liter per day
L/y	liter per year
m	meter
mBq	millibecquerel ( $10^{-3}$ Bq)
mBq/g	millibecquerel per gram ( $10^{-3}$ Bq/g)
mBq/dry g	millibecquerel per dry gram ( $10^{-3}$ Bq/dry g)
mBq/m <sup>3</sup>	millibecquerel per cubic meter ( $10^{-3}$ Bq/m <sup>3</sup> )
mCi	millicurie ( $10^{-3}$ Ci)
mg/L	milligram/liter ( $10^{-3}$ g/L)
mi	mile
mph	mile per hour
mR	milliroentgen ( $10^{-3}$ R) (See <i>also</i> definition of “roentgen” in <b>Key Terms</b> section.)
mrem	millirem ( $10^{-3}$ rem) (See <i>also</i> definition of “rem” in <b>Key Terms</b> section.)
mrem/y	millirem per year ( $10^{-3}$ rem/y)
m/s	meter per second
mSv	millisievert ( $10^{-3}$ Sv)
mSv/y	millisievert per year ( $10^{-3}$ Sv/y)

## Acronyms and Glossary

MT	metric ton
nBq	nanobecquerel ( $10^{-9}$ Bq)
nSv	nanosievert ( $10^{-9}$ Sv)
nSv/y	nanosievert per year ( $10^{-9}$ Sv/y)
pCi	picocurie ( $10^{-12}$ Ci)
pCi/g	picocurie per gram ( $10^{-12}$ Ci/g)
pCi/dry g	picocurie per dry gram ( $10^{-12}$ Ci/dry g)
pCi/L	picocurie per liter ( $10^{-12}$ Ci/liter)
person-Sv	person-sievert (See also definition in <b>Key Terms</b> section.)
person-Sv/y	person-sievert/year
pg/L	picogram per liter ( $10^{-12}$ g/L)
pg/m <sup>3</sup>	picogram per cubic meter ( $10^{-12}$ g/m <sup>3</sup> )
Sv	sievert (See also definition in <b>Key Terms</b> section.)
TBq	terabecquerel ( $10^{12}$ Bq)

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## Acronyms and Abbreviations

%RSD	Percent relative standard deviation
ACCD	Alameda County Community Development Agency
ACDEH	Alameda County Department of Environmental Health
ACHP	Advisory Council on Historic Preservation
ACOE	Army Corps of Engineers
AFV	alternative fuel vehicle
ALARA	as low as reasonably achievable
APHIS	Animal and Plant Health Inspection Service
ATSDR	Agency for Toxic Substances and Disease Registry
BAAQMD	Bay Area Air Quality Management District (See also definition in <b>Key Terms</b> section.)
BCG	Biota Concentration Guide
BGS	Below Ground Surface
BO	biological opinion
BSA	Blanket Service Agreement
BSL	Biosafety Level
CAA	Clean Air Act
CalARP	California Accidental Release Prevention
CAMP	Corrective Action Monitoring Plan
CAMU	Corrective Action Management Unit
CARB	California Air Resources Board
CCR	California Code of Regulations
CDC	Centers for Disease Control
CDFG	California Department of Fish and Game
CEI	Compliance Evaluation Inspection
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980 (See also definition in <b>Key Terms</b> section.)
CFF	Contained Firing Facility
CFR	Code of Federal Regulations
CMWMA	California Medical Waste Management Act
CNPS	California Native Plant Society
CO	carbon monoxide
COC	constituent of concern

COD	chemical oxygen demand
CSA	container storage area
CUPA	Certified Unified Program Agencies
CVRWQCB	Central Valley Regional Water Quality Control Board (See <i>also</i> definition in <b>Key Terms</b> section.)
CWA	(Federal) Clean Water Act
CWG	Community Working Group
DCS	Derived Concentration Technical Standard
DMP	Detection Monitoring Plan
DMT	Data Management Team
DOE	(U.S.) Department of Energy (See <i>also</i> definition in <b>Key Terms</b> section.)
DOECAP	(U.S.) Department of Energy Consolidated Auditing Program
DOT	(U.S.) Department of Transportation
DPH	Department of Public Health
DPR	(California) Department of Pesticide Regulation
DRB	Drainage Retention Basin
DTSC	(California Environmental Protection Agency) Department of Toxic Substances Control
DWTF	Decontamination and Waste Treatment Facility
E85	Vehicle fuel, 85% ethanol and 15% gasoline
EA	environmental assessment
EDE	effective dose equivalent (See <i>also</i> definition in <b>Key Terms</b> section.)
EDO	Environmental Duty Officer
EFA	Environmental Functional Area
EIS	environmental impact statement
ELAP	Environmental Laboratory Accreditation Program
EMP	Environmental Management Plan
EMS	Environmental Management System
EPA	Environmental Protection Agency (See <i>also</i> definition in <b>Key Terms</b> section.)
EPCRA	Emergency Planning and Community Right-to-Know Act of 1986 (See <i>also</i> definition in <b>Key Terms</b> section.)
EPD	(LLNL) Environmental Protection Department
EPEAT	Electronic Product Environmental Assessment Tool
EPL	effluent pollutant limit
EPP	Environmentally Preferable Purchasing
ERD	(LLNL) Environmental Restoration Department
ERP	Environmental Restoration Project
ES&H	Environment, Safety, and Health
ESA	Endangered Species Act
ESAR	Enhanced Source Area Remediation
EWSF	Explosives Waste Storage Facility
EWTF	Explosives Waste Treatment Facility
FFA	Federal Facility Agreement (See <i>also</i> definition in <b>Key Terms</b> section.)
FFCA	Federal Facilities Compliance Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FY	fiscal year (See <i>also</i> definition in <b>Key Terms</b> section.)
GHG	greenhouse gases
GPS	global positioning system
GPs	Guiding principles
GSA	(U.S.) General Services Administration
GSF	Gross square feet
GWP	(Livermore site) Ground Water Project

## Acronyms and Glossary

HAP	hazardous air pollutant
HHRA	Human health risk assessment
HPGe	high-purity germanium
HSU	hydrostratigraphic unit
HT/TT	tritiated hydrogen gas
HTO/TTO	tritiated water or tritiated water vapor
HWCL	Hazardous Waste Control Law (See <i>also</i> definition in <b>Key Terms</b> section.)
ICRP	International Commission on Radiological Protection
IEEE	Institute of Electrical and Electronics Engineers
ILA	industrial, landscaping, and agricultural
IQR	Interquartile range (See <i>also</i> definition in <b>Key Terms</b> section.)
ISMS	Integrated Safety Management System
ISO	International Organization for Standardization
ITS	Institutional Tracking System
LEED	Leadership in Energy and Environmental Design
LEED-EB	Leadership in Energy and Environmental Design for Existing Buildings
LEPC	Local Emergency Planning Committee
LLNL	Lawrence Livermore National Laboratory
LLNS	Lawrence Livermore National Security, LLC
LLW	Low Level Waste
LWRP	Livermore Water Reclamation Plant
MAPEP	Mixed Analyte Performance Evaluation Program
MARLAP	Multi-Agency Radiological Laboratory Analytical Protocols
MCL	maximum contaminant level (See <i>also</i> definition in <b>Key Terms</b> section.)
MDC	minimum detectable concentration
MOVIs	Management, Observation, Verification and Inspections
MRP	Monitoring and Reporting Program
MSAs	Management Self Assessments
MSDS	material safety data sheet
NCRP	National Council on Radiation Protection and Measurements
NELAP	National Environmental Laboratory Accreditation Program
NEPA	National Environmental Policy Act (See <i>also</i> definition in <b>Key Terms</b> section.)
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NIF	National Ignition Facility
NNSA	National Nuclear Security Administration
NOx	nitrous oxides
NPDES	National Pollutant Discharge Elimination System (See <i>also</i> definition in <b>Key Terms</b> section.)
NRHP	National Register of Historic Places
OBT	organically bound tritium
ODS	ozone depleting substance
ORNL	Oak Ridge National Laboratory
OU	operable unit
P2S	pollution prevention/sustainability
PA	Programmatic Agreement
PEP	Performance Evaluation Plan
PCB	polychlorinated biphenyl
PCE	perchloroethylene (or perchloroethene); also called tetrachloroethylene or tetrachloroethene
PM-10	particulate matter with diameter equal to or less than 10 micrometer
POCs	Precursor organic compounds (See <i>also</i> definition in <b>Key Terms</b> section.)

PPMRP	Pollution Prevention and Monitoring and Reporting Program
PQL	practical quantitation limit (See <i>also</i> definition in <b>Key Terms</b> section.)
PRAD	(LLNL) Permits and Regulatory Affairs Division
PUE	Power Utilization Effectiveness
QA	quality assurance (See <i>also</i> definition in <b>Key Terms</b> section.)
QC	quality control (See <i>also</i> definition in <b>Key Terms</b> section.)
RCRA	Resource Conservation and Recovery Act of 1976 (See <i>also</i> definition in <b>Key Terms</b> section.)
REC	Renewable Energy Credit
RHWM	(LLNL) Radioactive and Hazardous Waste Management Division
RL	reporting limit
RMP	risk management plan
ROD	Record of Decision
ROGs	reactive organic gases (See <i>also</i> definition in <b>Key Terms</b> section.)
RPM	Remedial Project Managers
RWQCB	Regional Water Quality Control Board (See <i>also</i> definition in <b>Key Terms</b> section.)
SARA	Superfund Amendment and Reauthorization Act of 1986 (See <i>also</i> definition in <b>Key Terms</b> section.)
SDWA	Safe Drinking Water Act
SERC	State Emergency Response Commission
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board (See <i>also</i> definition in <b>Key Terms</b> section.)
SFTF	Small Firearms Training Facility
SHPO	State Historic Preservation Officer
SI	Système International d'Unités (See <i>also</i> definition in <b>Key Terms</b> section.)
SJCEHD	San Joaquin County Environmental Health Department (See <i>also</i> definition in <b>Key Terms</b> section.)
SJCOES	San Joaquin County, Office of Emergency Services
SJVAPCD	San Joaquin Valley Air Pollution Control District (See <i>also</i> definition in <b>Key Terms</b> section.)
SMOP	Synthetic Minor Operating Permit
SMS	(LLNL) Sewer Monitoring Station
SOx	sulphur oxides
SPCC	Spill Prevention Control and Countermeasure
STP	Site Treatment Plan
SW-MEI	site-wide maximally exposed individual member (of the public) (See <i>also</i> definition in <b>Key Terms</b> section.)
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAG	Technical Assistance Grant
TBOS/TKEBS	tetrabutyl orthosilicate/tetrakis 2-ethylbutyl silane
TCE	trichloroethene (or trichloroethylene)
TEF	toxicity equivalency factor
TEQ	toxicity equivalency
TF	treatment facility
TLD	thermoluminescent dosimeter (See <i>also</i> definition in <b>Key Terms</b> section.)
TNI	The NELAC Institute
TRI	Toxics Release Inventory
Tri-Valley CAREs	Tri-Valley Communities Against a Radioactive Environment
TRU	transuranic (waste) (See <i>also</i> definition in <b>Key Terms</b> section.)
TSCA	Toxic Substances Control Act
TSF	Terascale Simulation Facility

## Acronyms and Glossary

TSS	total suspended solids (See <i>also</i> definition in <b>Key Terms</b> section.)
TTO	total toxic organic (compounds)
UCD	under dispenser containment
USGBC	U.S. Green Building Council
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound (See <i>also</i> definition in <b>Key Terms</b> section.)
VTF	vapor treatment facility
WAA	waste accumulation area (See <i>also</i> definition in <b>Key Terms</b> section.)
WDAR	Waste Discharge Authorization Requirement
WDR	Waste Discharge Requirement
WRD	Water Resources Division (See <i>also</i> definition in <b>Key Terms</b> section.)

## Metric and U.S. Customary Unit Equivalents

Category	From metric unit to U.S. customary equivalent unit		From U.S. customary unit to metric equivalent unit	
	Metric	U.S.	U.S.	Metric
Length	1 centimeter (cm)	0.39 inches (in.)	1 inch (in.)	2.54 centimeters (cm)
	1 millimeter (mm)	0.039 inches (in.)		25.4 millimeters (mm)
	1 meter (m)	3.28 feet (ft)	1 foot (ft)	0.3048 meters (m)
		1.09 yards (yd)	1 yard (yd)	0.9144 meters (m)
	1 kilometer (km)	0.62 miles (mi)	1 mile (mi)	1.6093 kilometers (km)
Volume	1 liter (L)	0.26 gallons (gal)	1 gallon (gal)	3.7853 liters (L)
		$8.11 \times 10^{-7}$ acre-feet	1 acre-foot	$1.23 \times 10^6$ liters (L)
	1 cubic meter (m <sup>3</sup> )	35.32 cubic feet (ft <sup>3</sup> )	1 cubic foot (ft <sup>3</sup> )	0.028 cubic meters (m <sup>3</sup> )
		1.35 cubic yards (yd <sup>3</sup> )	1 cubic yard (yd <sup>3</sup> )	0.765 cubic meters (m <sup>3</sup> )
Weight	1 gram (g)	0.035 ounces (oz)	1 ounce (oz)	28.6 gram (g)
	1 kilogram (kg)	2.21 pounds (lb)	1 pound (lb)	0.373 kilograms (kg)
	1 metric ton (MT)	1.10 short ton (2000 pounds)	1 short ton (2000 pounds)	0.90718 metric ton (MT)
Area	1 hectare (ha)	2.47 acres	1 acre	0.40 hectares (ha)
Radioactivity	1 becquerel (Bq)	$2.7 \times 10^{-11}$ curie (Ci)	1 curie (Ci)	$3.7 \times 10^{10}$ becquerel (Bq)
Radiation dose	1 gray (Gy)	100 rad	1 rad	0.01 gray (Gy)
Radiation dose equivalent	1 sievert (Sv)	100 rem	1 rem	0.01 sievert (Sv)
Temperature	°Fahrenheit = (°Centigrade x 1.8) + 32		°Centigrade = (°Fahrenheit – 32) / 1.8	

## Multiplying Prefixes

Symbol	Prefix	Factor	Symbol	Prefix	Factor
v	vendeko	10 <sup>-30</sup>	da	deca	10 <sup>1</sup>
x	xenno	10 <sup>-27</sup>	h	hecto	10 <sup>2</sup>
y	yocto	10 <sup>-24</sup>	k	kilo	10 <sup>3</sup>
z	zepto	10 <sup>-21</sup>	M	mega	10 <sup>6</sup>
a	atto	10 <sup>-18</sup>	G	giga	10 <sup>9</sup>
f	femto	10 <sup>-15</sup>	T	tera	10 <sup>12</sup>
p	pico	10 <sup>-12</sup>	P	peta	10 <sup>15</sup>
n	nano	10 <sup>-9</sup>	E	exa	10 <sup>18</sup>
μ	micro	10 <sup>-6</sup>	Z	zetta	10 <sup>21</sup>
m	milli	10 <sup>-3</sup>	Y	yotta	10 <sup>24</sup>
c	centi	10 <sup>-2</sup>			
d	deci	10 <sup>-1</sup>			

### Key Terms

**Absorbed dose.** Amount of energy imparted to matter by ionizing radiation per unit mass of irradiated material, in which the absorbed dose is expressed in units of rad or gray (1 rad = 0.01 gray).

**Accuracy.** Closeness of the result of a measurement to the true value of the quantity measured.

**Action level.** Defined by regulatory agencies, the level of pollutants which, if exceeded, requires regulatory action.

**Alluvium.** Sediment deposited by flowing water.

**Alpha particle.** Positively charged particle emitted from the nucleus of an atom, having mass and charge equal to those of a helium nucleus (two protons and two neutrons).

**Ambient air.** Surrounding atmosphere, usually the outside air, as it exists around people, plants, and structures; for monitoring purposes, it does not include air immediately adjacent to emission sources.

**Analyte.** Specific component measured in a chemical analysis.

**Aquifer.** Saturated layer of rock or soil below the ground surface that can supply usable quantities of groundwater to wells and springs, and be a source of water for domestic, agricultural, and industrial uses.

**Bay Area Air Quality Management District (BAAQMD).** Local agency responsible for regulating stationary air emission sources (including the LLNL Livermore site) in the San Francisco Bay Area.

**Becquerel (Bq).** SI unit of activity of a radionuclide, equal to the activity of a radionuclide having one spontaneous nuclear transition per second.

**Beta particle.** Negatively charged particle emitted from the nucleus of an atom, having charge, mass, and other properties of an electron.

**Categorical discharge.** Discharge from a process regulated by EPA rules for specific industrial categories.

**Central Valley Regional Water Quality Control Board (CVRWQCB).** Local agency responsible for regulating ground and surface water quality in the Central Valley.

**Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA).** Administered by EPA, this federal law, also known as Superfund, requires private parties to notify the EPA of conditions that threaten to release hazardous substances or after the release of hazardous substances, and undertake short-term removal and long-term remediation.

**Cosmic radiation.** Radiation with very high energies originating outside the earth's atmosphere; it is one source contributing to natural background radiation.

**Curie (Ci).** Unit of measurement of radioactivity, defined as the amount of radioactive material in which the decay rate is  $3.7 \times 10^{10}$  disintegrations per second or  $2.22 \times 10^{12}$  disintegrations per minute; one Ci is approximately equal to the decay rate of 1 gram of pure radium.

**Depleted uranium.** Uranium having a lower proportion of the isotope uranium-238 than is found in naturally occurring uranium. The masses of the three uranium isotopes with atomic weights 238, 235, and 234 occur in depleted uranium in the weight-percentages 99.8, 0.2, and  $5 \times 10^{-4}$ , respectively. Depleted uranium is sometimes referred to as D-38 or DU.

**Derived concentration technical guide (DCS).** Concentrations of radionuclides in water and air that could be continuously consumed or inhaled for one year and not exceed the DOE primary radiation standard to the public (100 mrem/y EDE).

**Dose.** Energy imparted to matter by ionizing radiation; the unit of absorbed dose is the rad, equal to 0.01 joules per kilogram for irradiated material in any medium.

**Dose equivalent.** Product of absorbed dose in rad (or gray) in tissue and a quality factor representing the relative damage caused to living tissue by different kinds of radiation, and perhaps other modifying factors representing the distribution of radiation, etc. expressed in units of rem or sievert (1 rem = 0.01 sievert).

**Dosimeter.** Portable detection device for measuring the total accumulated exposure to ionizing radiation.

**Downgradient.** In the direction of groundwater flow from a designated area; analogous to downstream.

**Effective dose equivalent (EDE).** Estimate of the total risk of potential effects from radiation exposure, it is the summation of the products of the dose equivalent and weighting factor for each tissue. The weighting factor is the

decimal fraction of the risk arising from irradiation of a selected tissue to the total risk when the whole body is irradiated uniformly to the same dose equivalent. These factors permit dose equivalents from nonuniform exposure of the body to be expressed in terms of an effective dose equivalent that is numerically equal to the dose from a uniform exposure of the whole body that entails the same risk as the internal exposure (ICRP 1980). The effective dose equivalent includes the committed effective dose equivalent from internal deposition of radionuclides and the effective dose equivalent caused by penetrating radiation from sources external to the body, and is expressed in units of rem (or sievert).

**Effluent.** Liquid or gaseous waste discharged to the environment.

**Electronvolt (eV).** A unit of energy equal to the amount of kinetic energy gained by an electron when it passes through a potential difference of 1 volt in a vacuum.

**Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA).** Act that requires facilities that produce, use, or store hazardous substances to report releases of reportable quantities or hazardous substances to the environment.

**Environmental impact statement (EIS).** Detailed report, required by the National Environmental Policy Act, on the environmental impacts from a federally approved or funded project. An EIS must be prepared by a federal agency when a “major” federal action that will have “significant” environmental impacts is planned.

**Federal facility.** Facility that is owned or operated by the federal government, subject to the same requirements as other responsible parties when placed on the Superfund National Priorities List.

**Federal facility agreement (FFA).** Negotiated agreement that specifies required actions at a federal facility as agreed upon by various agencies (e.g., EPA, RWQCB, DOE).

**Fiscal year (FY).** LLNL’s fiscal year is from October 1 through September 30.

**Freon-11.** Trichlorofluoromethane.

**Freon-113.** 1,1,2-trichloro-1,2,2-trifluoroethane; also known as CFC 113.

**Gamma ray.** High-energy, short-wavelength, electromagnetic radiation emitted from the nucleus of an atom, frequently accompanying the emission of alpha or beta particles.

**Groundwater.** All subsurface water.

**Hazardous waste.** Waste that exhibits ignitability, corrosivity, reactivity, and/or EP-toxicity (yielding toxic constituents in a leaching test), and waste that does not exhibit these characteristics but has been determined to be hazardous by EPA. Although the legal definition of hazardous waste is complex, according to EPA the term generally refers to any waste that, if managed improperly, could pose a threat to human health and the environment.

**(California) Hazardous Waste Control Law (HWCL).** Legislation specifying requirements for hazardous waste management in California.

**Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX).** High-explosive compound.

**Inorganic compounds.** Compounds that either do not contain carbon or do not contain hydrogen along with carbon, including metals, salts, and various carbon oxides (e.g., carbon monoxide and carbon dioxide).

**International Commission on Radiological Protection (ICRP).** International organization that studies radiation, including its measurement and effects.

**Interquartile range (IQR).** Distance between the top of the lower quartile and the bottom of the upper quartile, which provides a measure of the spread of data.

**Isotopes.** Forms of an element having the same number of protons in their nuclei, but differing numbers of neutrons.

**Lake Haussmann.** Man-made, lined pond used to capture storm water runoff and treated water at the Livermore site. Formerly called Drainage Retention Basin (DRB).

**Less than detection limits.** Phrase indicating that a chemical constituent was either not present in a sample, or is present in such a small concentration that it cannot be measured by a laboratory’s analytical procedure, and therefore is not identified or not quantified at the lowest level of sensitivity.

**Livermore Water Reclamation Plant (LWRP).** City of Livermore’s municipal wastewater treatment plant, which accepts discharges from the LLNL Livermore site.

## Acronyms and Glossary

**Low-level waste.** Waste defined by DOE Order 5820.2A, which contains transuranic nuclide concentrations less than 100 nCi/g.

**Maximum contaminant level (MCL).** Highest level of a contaminant in drinking water that is allowed by the U.S. Environmental Protection Agency or California Department of Health Services.

**Metric units.** Except for temperature for which specific equations apply, U.S. customary units can be determined from metric units by multiplying the metric units by the U.S. customary equivalent. Similarly, metric units can be determined from U.S. customary equivalent units by multiplying the U.S. customary units by the metric equivalent. (See also **Metric and U.S. Customary Unit Equivalents** table in this Glossary.)

**Mixed waste.** Waste that has the properties of both hazardous and radioactive waste.

**National Environmental Policy Act (NEPA).** Federal legislation enacted in 1969 that requires all federal agencies to document and consider environmental impacts for federally funded or approved projects and the legislation under which DOE is responsible for NEPA compliance at LLNL.

**National Pollutant Discharge Elimination System (NPDES).** Federal regulation under the Clean Water Act that requires permits for discharges into surface waterways.

**Nuclear Regulatory Commission (NRC).** Federal agency charged with oversight of nuclear power and nuclear machinery and applications not regulated by DOE or the Department of Defense.

**Nuclide.** Species of atom characterized by the constitution of its nucleus. The nuclear constitution is specified by the number of protons, number of neutrons, and energy content; or, alternatively, by the atomic number, mass number, and atomic mass. To be regarded as a distinct nuclide, the atom must be capable of existing for a measurable length of time.

**Part B permit.** Second, narrative section submitted by generators in the RCRA permitting process that covers in detail the procedures followed at a facility to protect human health and the environment.

**Perched aquifer.** Aquifer that is separated from another water-bearing stratum by an impermeable layer.

**Person-Sievert (person-Sv).** The product of the average dose per person times the number of people exposed.  
1 person-Sv = 100 person-rem.

**pH.** Measure of hydrogen ion concentration in an aqueous solution. The pH scale ranges from 0 to 14. Acidic solutions have a pH less than 7; basic solutions have a pH greater than 7; and neutral solutions have a pH of 7.

**Pliocene.** Geological epoch of the Tertiary period, starting about 12 million years ago.

**PM-10.** Fine particulate matter with an aerodynamic diameter equal to or less than 10 micrometer.

**Point source.** Any confined and discrete conveyance (e.g., pipe, ditch, well, stack).

**Practical quantitation limit (PQL).** Level at which the laboratory can report a value with reasonably low uncertainty (typically 10–20% uncertainty).

**Pretreatment.** Any process used to reduce a pollutant load before it enters the sewer system.

**Quality assurance (QA).** System of activities whose purpose is to provide the assurance that standards of quality are attained with a stated level of confidence.

**Quality control (QC).** Procedures used to verify that prescribed standards of performance are attained.

**Quaternary.** Geologic era encompassing the last 2 to 3 million years.

**Rad.** Unit of absorbed dose and the quantity of energy imparted by ionizing radiation to a unit mass of matter such as tissue, and equal to 0.01 joule per kilogram, or 0.01 gray.

**Radioactive decay.** Spontaneous transformation of one radionuclide into a different nuclide (which may or may not be radioactive), or de-excitation to a lower energy state of the nucleus by emission of nuclear radiation, primarily alpha or beta particles, or gamma rays (photons).

**Radioactivity.** Spontaneous emission of nuclear radiation, generally alpha or beta particles, or gamma rays, from the nucleus of an unstable isotope.

**Radionuclide.** Unstable nuclide. See also **nuclide** and **radioactivity**.

**Reactive organic gases/precursor organic compounds (ROGs/POCs).** Classes of chemicals that are precursors to the production of ozone and the photochemical formation of smog.

**Regional Water Quality Control Board (RWQCB).** California regional agency responsible for water quality standards and the enforcement of state water quality laws within its jurisdiction. California is divided into nine RWQCBs; the Livermore site is in the San Francisco Bay Region, and Site 300 is in the Central Valley Region.

**Rem.** Unit of radiation dose equivalent and effective dose equivalent describing the effectiveness of a type of radiation to produce biological effects; coined from the phrase “roentgen equivalent man,” and the product of the absorbed dose (rad), a quality factor (Q), a distribution factor, and other necessary modifying factors.  
1 rem = 0.01 sievert.

**Resource Conservation and Recovery Act of 1976 (RCRA).** Program of federal laws and regulations that govern the management of hazardous wastes, and applicable to all entities that manage hazardous wastes.

**Risk assessment.** Qualitative and quantitative evaluation of the risk posed to human health and/or the environment by the actual or potential presence and/or use of specific pollutants.

**Roentgen (R).** Unit of measurement used to express radiation exposure in terms of the amount of ionization produced in a volume of air.

**San Francisco Bay Regional Water Quality Control Board (SFBRWQCB).** Local agency responsible for regulating ground and surface water quality in the San Francisco Bay Area.

**San Joaquin County Environmental Health Department (SJCEHD).** Local agency that enforces underground-tank regulations in San Joaquin County, including Site 300.

**San Joaquin Valley Air Pollution Control District (SJVAPCD).** Local agency responsible for regulating stationary air emission sources (including Site 300) in San Joaquin County.

**Sanitary waste.** Most simply, waste generated by routine operations that is not regulated as hazardous or radioactive by state or federal agencies.

**Saturated zone.** Subsurface zone below which all rock pore-space is filled with water; also called the phreatic zone.

**Sensitivity.** Capability of methodology or instrumentation to discriminate between samples having differing concentrations or containing varying amounts of analyte.

**Sievert (Sv).** SI unit of radiation dose equivalent and effective dose equivalent, that is the product of the absorbed dose (gray), quality factor (Q), distribution factor, and other necessary modifying factors. 1 sievert = 100 rem.

**Sigma ( $\sigma$ )** denotes the standard deviation of a statistical distribution.

**Site-wide maximally exposed individual (SW-MEI).** Hypothetical person who receives, at the location of a given publicly accessible facility (such as a church, school, business, or residence), the greatest LLNL-induced effective dose equivalent (summed over all pathways) from all sources of radionuclide releases to air at a site. Doses at this receptor location caused by each emission source are summed, and yield a larger value than for the location of any other similar public facility. This individual is assumed to continuously reside at this location 24 hours per day, 365 days per year.

**Specific conductance.** Measure of the ability of a material to conduct electricity; also called conductivity.

**Superfund.** Common name used for the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). California has also established a “State Superfund” under provisions of the California Hazardous Waste Control Act.

**Superfund Amendments and Reauthorization Act (SARA).** Enacted in 1986, these laws amended and reauthorized CERCLA for five years.

**Surface impoundment.** A facility or part of a facility that is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials, although it may be lined with man-made materials. The impoundment is designed to hold an accumulation of liquid wastes, or wastes containing free liquids, and is not an injection well.

**Système International d’Unités (SI).** International system of physical units which include meter (length), kilogram (mass), kelvin (temperature), becquerel (radioactivity), gray (radioactive dose), and sievert (dose equivalent).

**Thermoluminescent dosimeter (TLD).** Device used to measure external beta or gamma radiation levels, and which contains a material that, after exposure to beta or gamma radiation, emits light when processed and heated.

**Total dissolved solids (TDS).** Portion of solid material in a waste stream that is dissolved and passed through a filter.

## Acronyms and Glossary

**Total suspended solids (TSS).** Total mass of particulate matter per unit volume suspended in water and wastewater discharges that is large enough to be collected by a 0.45 micron filter.

**Tritium.** Radioactive isotope of hydrogen, containing one proton and two neutrons in its nucleus, which decays at a half-life of 12.3 years by emitting a low-energy beta particle.

**Transuranic waste (TRU).** Material contaminated with alpha-emitting transuranium nuclides, which have an atomic number greater than 92 (e.g., plutonium-239), half-lives longer than 20 years, and are present in concentrations greater than 100 nCi/g of waste.

**Universal waste.** Hazardous waste that is widely produced by households and many different types of businesses. Universal waste includes televisions, computers and other electronic devices as well as batteries, fluorescent lamps, mercury thermostats, and other mercury-containing equipment. California's Universal Waste Rule allows individuals and businesses to transport, handle, and recycle universal waste in a manner that differs from the requirements for most hazardous wastes.

**Unsaturated zone.** Portion of the subsurface in which the pores are only partially filled with water and the direction of water flow is vertical; is also referred to as the vadose zone.

**U.S. Department of Energy (DOE).** Federal agency responsible for conducting energy research and regulating nuclear materials used for weapons production.

**U.S. Environmental Protection Agency (EPA).** Federal agency responsible for enforcing federal environmental laws. Although some of this responsibility may be delegated to state and local regulatory agencies, EPA retains oversight authority to ensure protection of human health and the environment.

**Vadose zone.** Partially saturated or unsaturated region above the water table that does not yield water to wells.

**Volatile organic compound (VOC).** Liquid or solid organic compounds that have a high vapor pressure at normal pressures and temperatures and thus tend to spontaneously pass into the vapor state.

**Waste accumulation area (WAA).** Officially designated area that meets current environmental standards and guidelines for temporary (less than 90 days) storage of hazardous waste before pickup by the Radioactive and Hazardous Waste Management Division for off-site disposal.

**Wastewater treatment system.** Collection of treatment processes and facilities designed and built to reduce the amount of suspended solids, bacteria, oxygen-demanding materials, and chemical constituents in wastewater.

**Water Resources Division:** The City of Livermore governmental organization dedicated to meeting Livermore's water, wastewater, and storm water utility needs.

**Water table.** Water-level surface below the ground at which the unsaturated zone ends and the saturated zone begins, and the level to which a well that is screened in the unconfined aquifer would fill with water.

**Weighting factor.** Tissue-specific value used to calculate dose equivalents which represents the fraction of the total health risk resulting from uniform, whole-body irradiation that could be contributed to that particular tissue.

**Zone 7.** Common name for the Alameda County Flood Control and Water Conservation District, Zone 7, which is the water agency for the Livermore–Amador Valley with responsibility for regional flood control and drinking water supply.